Lambda Expressions and Capture Continued Solutions

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Capture by Reference

- What effect does capture by reference have?
  - It allows the body of the lambda expression to modify the captured variable
- What syntax is used?
  - To capture a variable by reference, we put an & before it
- Write a simple program which demonstrates capture by reference

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Lambda capture implementation

- How is capture by reference implemented?
  - A lambda with capture by reference is implemented as a "functor with state"
  - The member variable is a reference
  - The captured variable is passed to the functor constructor by reference
  - The operator () can then modify the captured variable through the reference

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Equivalent code with functor

- Rewrite the program in the first slide to use a functor

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Implicit Capture

- What is meant by implicit capture?
  - In an implicit capture, all variables in scope are captured by the lambda expression
- What syntax is used for implicit capture?
  - [=] for implicit capture by value
  - [&] for implicit capture by reference

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Implicit Capture Contd

- Is implicit capture safe?
  - Implicit capture by value is safe
  - Implicit capture by reference allows the lambda to change any variable in scope. This can be confusing and is potentially dangerous, so should be avoided
- Can implicit capture be made safer?
  - We can exclude some variables from implicit capture
  - [=, &x] will capture x by reference, all others by value. Only x can be modified by the lambda
  - [&, =a, =b] will capture a and b by value, all others by reference. a and b cannot be modified by the lambda

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Lambda Functions and Member Functions

- If a lambda expression is defined inside a member function, can it access other members of the object?
  - Yes. This can be done by capturing "this"
  - The lambda will have access to all the data members and member functions of the object
- Write a simple program in which a lambda expression is defined inside a member function

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